Skills Training and Manufacturing Innovations Are Key to Raising Rural Workers' Wages

Manufacturing innovations, such as new technologies and work organization practices, have generally been linked to higher wages in both rural and urban areas. These innovations have also been linked to increased training and higher skill levels and needs, particularly in the areas of interpersonal, problem-solving, and computer skills. Low-wage workers, who tend to be more concentrated in rural areas, are less likely to receive training than are higher wage workers. Thus, an emphasis on and encouragement of training and skills enhancement among more vulnerable low-wage workers is important and may enhance these workers' future earning capabilities.

Rural manufacturing wages lag behind urban wages, according to data from the ERS Rural Manufacturing Survey (RMS) (see "Data Sources" appendix). Rural manufacturers reported paying their workers an average of $8.90 an hour in 1995, $1.60 (18 percent) less than in urban areas. In addition, rural firms were far more likely to be low-wage firms, where low-wage is defined as paying average wages of $7.50 (the hourly rate equivalent of the 1995 poverty line) or less. About 36 percent of rural firms were low-wage employers, compared with 20 percent of urban firms. Furthermore, the more rural the location, the more likely a firm was to pay average wages at or below $7.50.

A number of other characteristics identify low-wage firms. They tend to adopt fewer technologies and are less likely to introduce new work organization techniques (see box, "RMS Measures of Technology Use and Work Organization Practices"). Firms with fewer employees are more likely to pay lower wages as are those hiring larger shares of women and minority workers. Low-wage firms also tend to hire less educated workers. In addition, low-wage employers are lumped into particular industries. Well over 50 percent of firms in the apparel and leather industries are low-wage. In rural areas, 50 percent or more of all producers of food and kindred products, textiles, lumber, and electronics are also low-wage employers. Finally, low-wage firms are less likely to provide training for workers, suggesting that workers in low-wage plants, who are already likely to be less educated than other workers, are also less likely to obtain further training through their employer, thus perpetuating their low-wage, low-skill status.

According to the RMS survey, not only are wages in metro areas higher than in nonmetro areas, but they increased more in metro areas, between 1992 and 1995. In real terms nonmetro wages rose an average of $0.42, compared with $0.52 in metro areas, about a 20-percent greater increase. Thus, the gap between metro and nonmetro manufacturing wages may be growing.

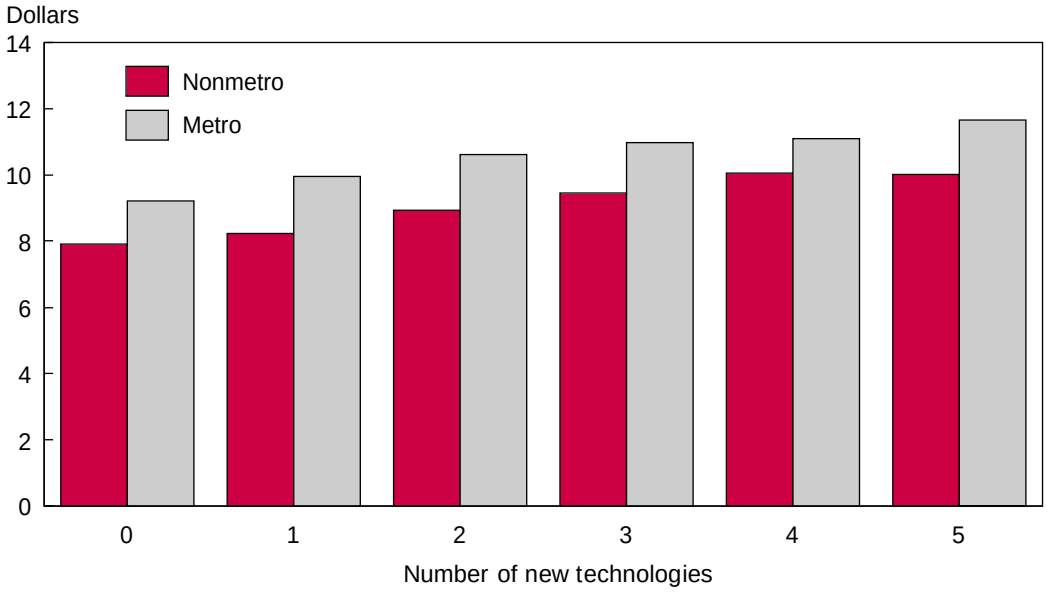
Nonmetro Wages Rise With New Technology and Work Organization Use

The greater the number of new technologies a firm adopted, the higher the workers' average wages were, for both metro and nonmetro areas. The gap neither narrowed nor widened with the introduction of new technologies (fig. 1). Differences in technology adoption, then, cannot explain the metro/nonmetro wage gap, although they can shed some light on wage differences among workers in metro and nonmetro areas.

RMS Measures of Technology Use and Work Organization Practices

In the Rural Manufacturing Survey, interviewees were asked to identify whether they had adopted one or more of five manufacturing technologies, including: Computer Aided Design (CAD), CAD/Computer Aided Manufacturing (CAD/CAM), Local Area Networks (LAN), numerical machines and/or programmable controllers. In addition, they were asked if they used the following work organization strategies: self-directed teams, quality circles (employee problem-solving), statistical control processing, total quality management (TQM), and/or job rotation. Interviewees were also asked about the average hourly wage for manufacturing workers in their plant at the time of the survey (1995) and in 1992. Finally, interviewees were asked how much they thought that various skills required of production workers, including reading, math, problem-solving, interpersonal, computer and other technical skills, had increased.

Figure 1
Average hourly wages, by number of new technologies and residence, 1995
Workers earned more in plants that used more new technologies



Source: Calculated by ERS using data from the Rural Manufacturing Survey.

The use of new technologies did not change the rural/urban gap, but the adoption of new organizational practices did narrow the gap a little. The positive relationship between wages and work organization techniques was ambiguous in metro areas, while among nonmetro firms a positive association between the number of work organization techniques a firm adopted and the wages they paid was more evident (fig. 2).

Urban wages grew more than rural wages, no matter how many new technologies were introduced, suggesting that something other than manufacturing innovations was driving the wage gains (fig. 3). Similarly, urban workers experienced greater wage gains no matter how many work organization techniques the firm had adopted (fig. 4). Although rural workers gained less than urban workers generally, the largest gains for rural workers were in firms using more new technologies and work organization practices.

Nontraditional Skills May Prepare Workers for Better-Paying Jobs

New technology and work organization adoption practices can explain differences in wages between workers, although they cannot shed much light on the rural/urban gap. Both rural and urban workers benefit from working in innovative firms. A firm's ability to adopt new manufacturing techniques though may be contingent on workers' skills. One of the reasons businesses reported for not adopting new technologies or management practices was inadequacy of worker skills. Earlier analysis also showed that nonmetro firms lagged behind metro firms in technology adoption, primarily because more low technology industries were located in rural areas (see F. Gale, Agricultural Information Bulletin 736-01, Aug. 1997). Firms using newer technologies may be reluctant to locate in rural areas and rural firms may not adopt new technologies, because of a perceived or actual lack of skills among rural workers.

The RMS survey asked employers about changes in the production job requirements for six types of worker skills, including math, reading, computer, problem-solving, teamwork, and other technical skills. Firms reporting the use of new technologies and/or work organization techniques were more likely to report increases in their skill requirements in all

Figure 2

Average hourly wages, by number of work organization practices and residence, 1995

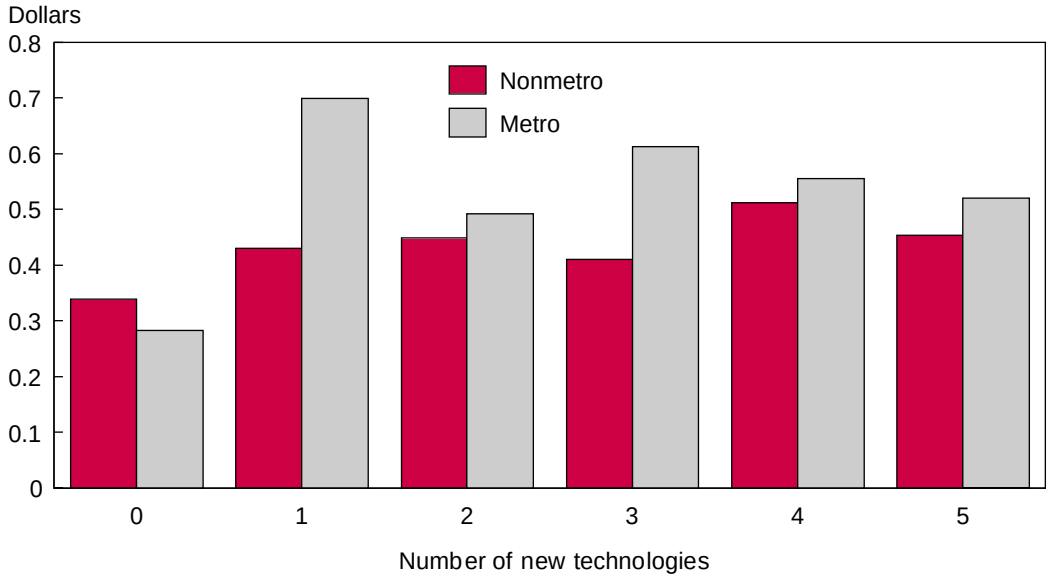
Nonmetro workers earned more in plants that used more work organization practices

Source: Calculated by ERS using data from the Rural Manufacturing Survey.

Figure 3

Change in real wages, by number of new technologies and residence, 1992-95

Real wage gains were lower for nonmetro workers, except in firms with no new technologies



Note: 1995 wages were converted to 1992 dollars using the chain-type personal consumption expenditures price index.
Source: Calculated by ERS using data from the Rural Manufacturing Survey.

Figure 4

Change in real wages, by number of work organization practices and residence, 1992-95

Real wage gains were lower for nonmetro workers, particularly in firms with fewer than two work organization practices

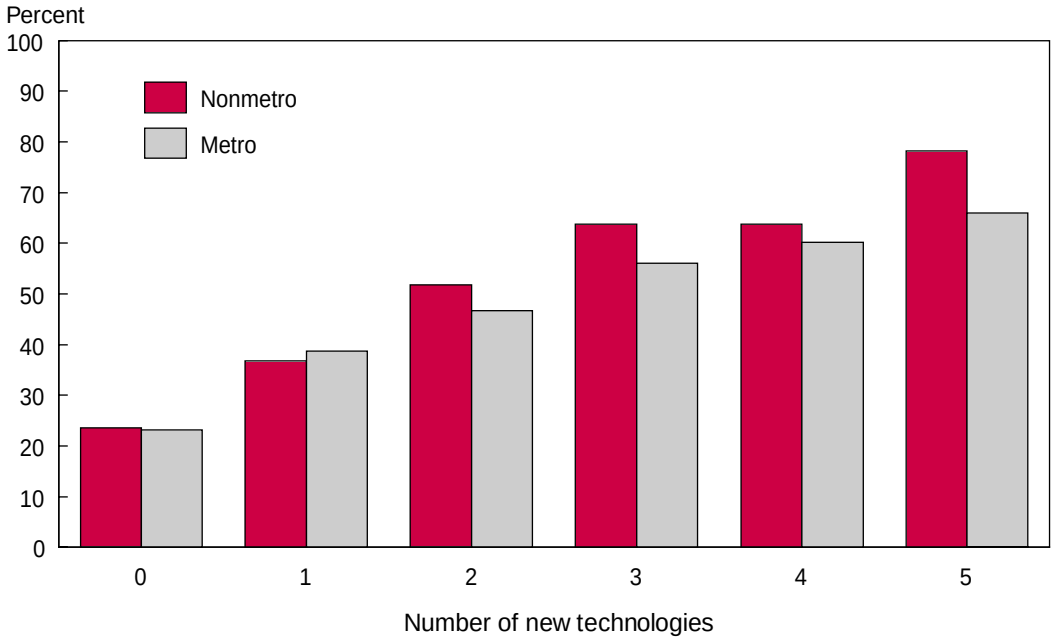
Note: 1995 wages were converted to 1992 dollars using the chain-type personal consumption expenditures price index.
Source: Calculated by ERS using data from the Rural Manufacturing Survey.

six areas. In particular, nontraditional skills (skills other than reading and math) appear increasingly important in today's labor market. Employers, particularly those who have introduced new technologies and work organization practices, emphasized the importance of computer and problem-solving skills, as well as the ability to work in teams. These skills, which are not traditionally emphasized in formal education, may be key to preparing workers for higher wage jobs.

Firms often address the lack of skills among workers by implementing their own training programs. Employers who have adopted innovations such as new technologies and work organization practices are far more likely to report providing training for their workers. The more new technologies a firm used, the more likely employers are to provide training, in both metro and nonmetro locations. Among firms using two to five new technologies, rural training rates actually exceeded urban rates (fig. 5). Similarly, the more work organization techniques a firm introduced, the more likely employers were to provide training (fig. 6). While rural workers in firms that have introduced new technologies and work organization practices were likely to receive on-the-job training, workers in firms with fewer innovations generally received less training. As such, workers already at the bottom end of the wage scale—including rural, female, and minority workers—were less likely to obtain additional skills through their employers.

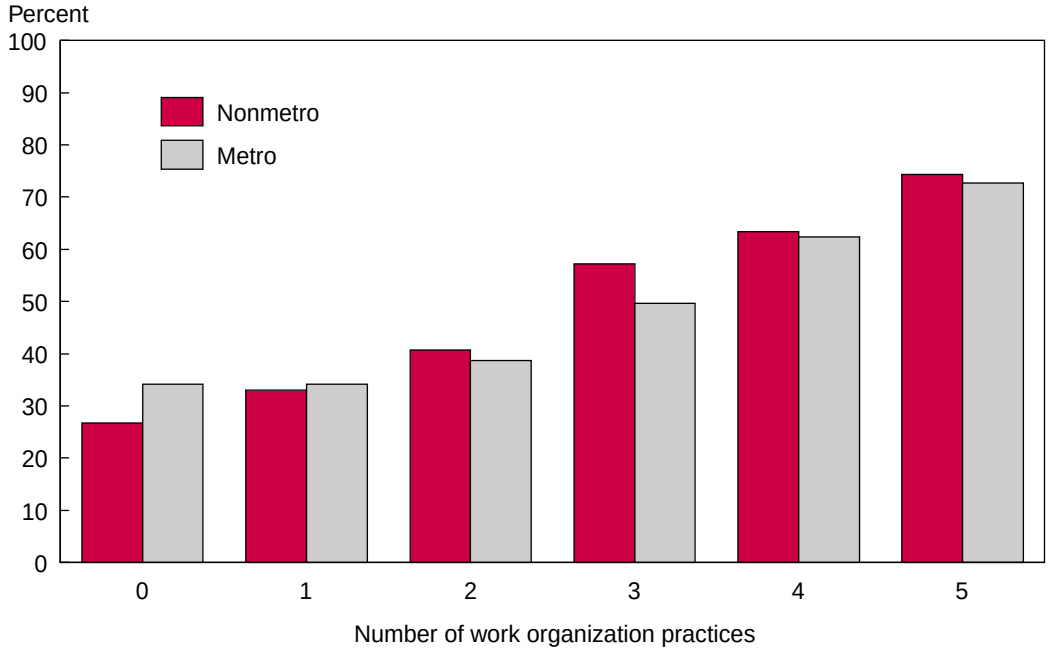
Worker training and skills enhancement are important both to ensure that industries have the workers they need and to increase workers' access to better paying jobs. While some firms may take the initiative to provide training and introduce innovative work practices, others may not. Firms may be hesitant to introduce innovations, precisely because of a

Figure 5
Firms providing training, by number of new technologies and residence, 1995
Training increased with the introduction of new technologies



Source: Calculated by ERS using data from the Rural Manufacturing Survey.

Figure 6
Firms providing training, by number of work organization practices and residence, 1995
Training inceased with the introduction of work organization practices



Source: Calculated by ERS using data from the Rural Manufacturing Survey.

perceived or real scarcity of skilled workers. As such, an increased emphasis on policies that focus on skill enhancement may be warranted, although the focus should be on skills not traditionally associated with formal schooling. In addition to computer and technical skills, the ability to solve problems and work in teams were skills that manufacturing employers identified as increasingly important in the workplace, particularly among firms adopting new technologies and innovative work organization practices. Targeting groups likely to be left behind because they are employed in low-wage firms, in particular workers in rural areas, as well as women and minorities, may help ensure higher wages for these groups.

Skills can be improved by targeting individual workers and employers and by providing additional incentives for training programs. For instance, targeting industries with low wages and a lack of training is one possibility. Such programs may be important because low-wage employers are the least likely to initiate training programs. By targeting those employed in low-wage manufacturing firms, or the low-wage plants themselves, policies can both enhance workers' earning potential and the pool of workers available to firms. This, in turn, may stimulate new innovations in manufacturing that are linked to higher productivity and wages. *[Jennifer C. Olmsted, jolmsted@oxy.edu; or Peggy Cook, 202-694-5419, pcook@ers.usda.gov]*